TECHNISCHE UNIVERSITÄT KAISERSLAUTERN

Module Handbook

TUK MODHB Homapage

Module MAT-14-11-M-3

Introduction to Numerical Methods (M, 9.0 LP)

Module Identification

Module Number	Module Name	CP (Effort)
MAT-14-11-M-3	*Introduction to Numerical Methods*	9.0 CP (270 h)

Basedata

CP, Effort	9.0 CP = 270 h
Position of the semester	1 Sem. in WiSe
Level	[3] Bachelor (Core)
Language	[DE] German
Module Manager	Pinnau, René, Prof. Dr. (PROF | DEPT: MAT)
Lecturers	Damm, Tobias, Prof. Dr. (PROF | DEPT: MAT) Klar, Axel, Prof. Dr. (PROF | DEPT: MAT) Pinnau, René, Prof. Dr. (PROF | DEPT: MAT) Simeon, Bernd, Prof. Dr. (PROF | DEPT: MAT)
Area of study	[MAT-GRU] Mathematics (B.Sc. year 1 and 2)
Reference course of study	[MAT-82.276-SG] B.Sc. Business Mathematics
Livecycle-State	[NORM] Active

Courses

Type/SWS	Course Number	Choice in Module-Part	SL	PL	CP	Sem.
4V+2U	**MAT-14-11-K-3**	P	U-Schein	PL1	9.0	WiSe

- About **[MAT-14-11-K-3]**: Title: "Introduction to Numerical Methods"; Presence-Time: 84 h; Self-Study: 186 h
- About **[MAT-14-11-K-3]**: The study achievement **"[U-Schein] proof of successful participation in the exercise classes**

(ungraded)" must be obtained.

Examination achievement PL1

- Form of examination: **oral examination (20-30 Min.)**
- Examination Frequency: each semester
- Examination number: 82036 ("Module Exam Introduction to Numerical Methods")

Evaluation of grades

The grade of the module examination is also the module grade.

Contents

From [MAT-14-11-K-3] Introduction to Numerical Methods:

The basic concepts and algorithms for the numerical solution of problems from Analysis and Linear Algebra are covered:

- approximation theory, interpolation of continuous and differentiable functions by polynomials or spline functions
- numerical integration: interpolation and Gaussian quadrature,
- numerical methods for linear systems of equations: Gauss elimination, Cholesky method, QR decomposition, perturbation theory,
- linear curve fitting,
- non-linear and parameter-dependent systems of equations,
- eigenvalue problems.

Competencies / intended learning achievements

Building on the knowledge acquired in the first year of their mathematical studies, the students have acquired basic theoretical and practical knowledge in an area of practical/applied mathematics.

They know and understand the basic methods and algorithms for the numerical solution of problems in linear algebra and analysis. They are able to think algorithmically and understand and apply basic techniques for the description and estimation of approximation and discretisation errors. They are able to critically assess the possibilities and limits of the use of numerical algorithms and they are able to work on smaller problems from science and technology using numerical methods.

In the exercise classes the students have acquired a confident, precise and independent handling of the terms, propositions and methods from the lecture.

Literature

From [MAT-14-11-K-3] Introduction to Numerical Methods:

- P. Deuflhard, A. Hohmann: Numerische Mathematik I,
- J. Stoer, R. Bulirsch: Numerische Mathematik,
- J. Werner: Numerische Mathematik.

Registration

Registration for the exercise classes via the online administration system URM (https://urm.mathematik.uni-kl.de).

Requirements for attendance of the module (informal)

Modules:

- [MAT-10-1-M-2] Fundamentals of Mathematics (M, 28.0 LP)

Requirements for attendance of the module (formal)

For students of the (Bachelor's) study programmes of the Department of Mathematics, the proof of successful participation in

the exercise classes of "Fundamentals of Mathematics I" or "Fundamentals of Mathematics II" (e.g. from the module **[MAT-10-1-M-2]** *"Fundamentals of Mathematics"*) is prerequisite for participation in the module examination.

References to Module / Module Number [MAT-14-11-M-3]

Course of Study	Section	Choice/Obligation
[MAT-82.276-SG] B.Sc. Business Mathematics	[Core Modules (non specialised)] General Mathematics	[P] Compulsory